

# Variability of Oil and Gas Well Productivities for Continuous (Unconventional) Petroleum Accumulations

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2013

Open-File Report 2013–1001

Sheet 3 of 3

## Variability Comes from Several Factors

### Spatial Changes in EUR

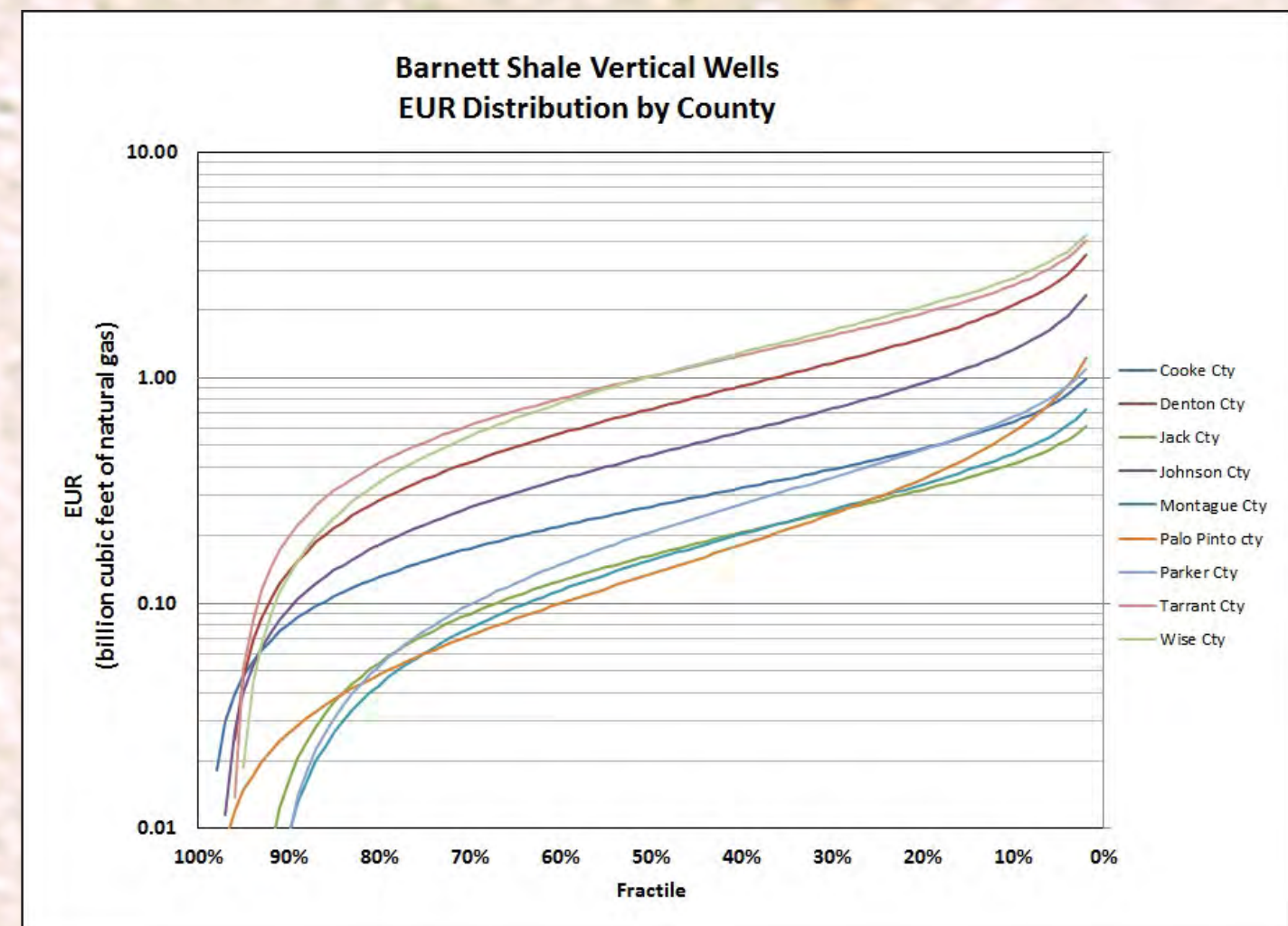


Figure 20. This plot of EUR distributions by county for Barnett Shale vertical wells shows the variability in well productivity from county to county. Compare with the comparable graph for horizontal wells (figure 21).

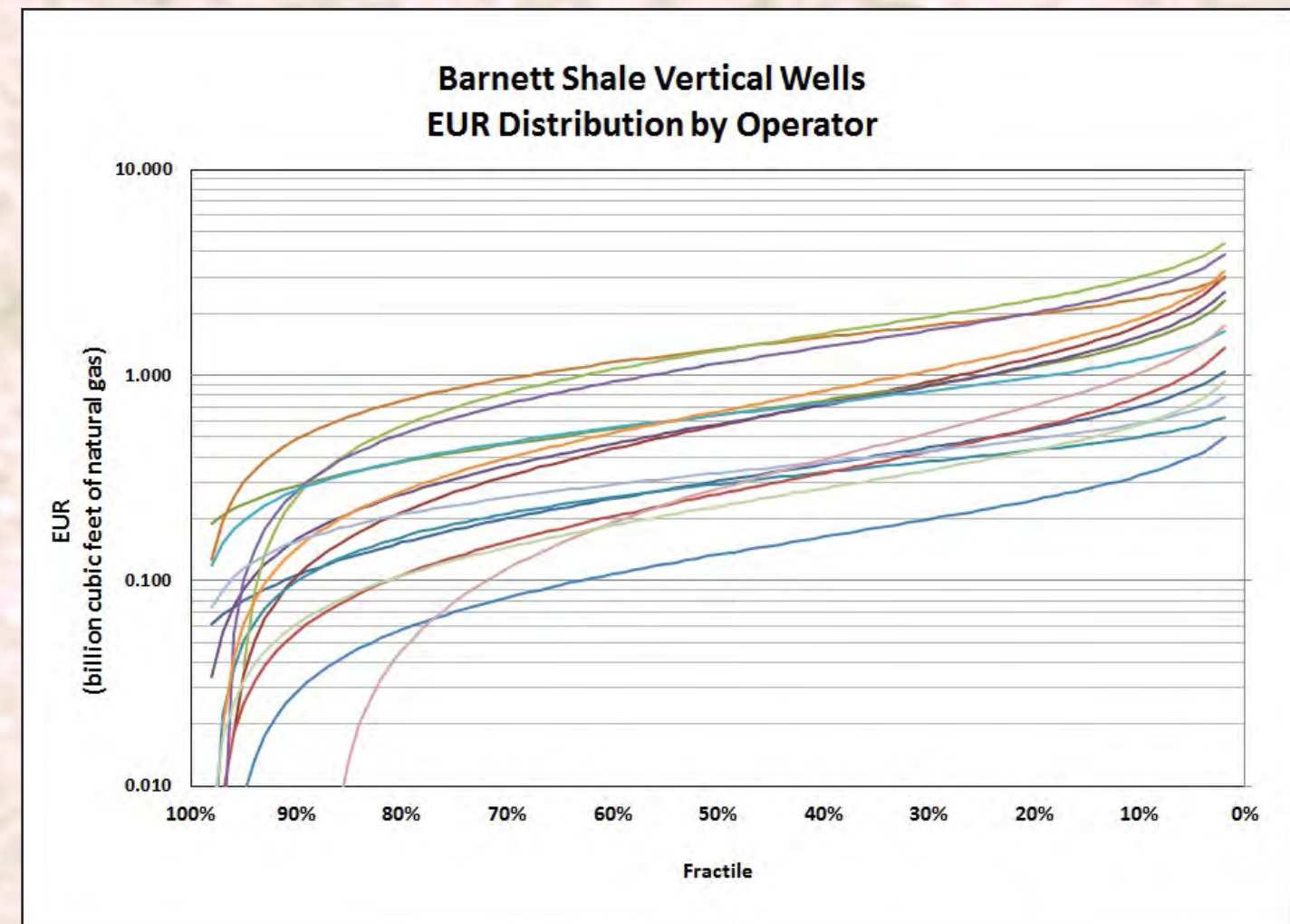


Figure 22. This plot of EUR distributions by operator for Barnett Shale vertical wells shows the variability in well productivity from operator to operator. Compare with the comparable graph for horizontal wells (figure 23).

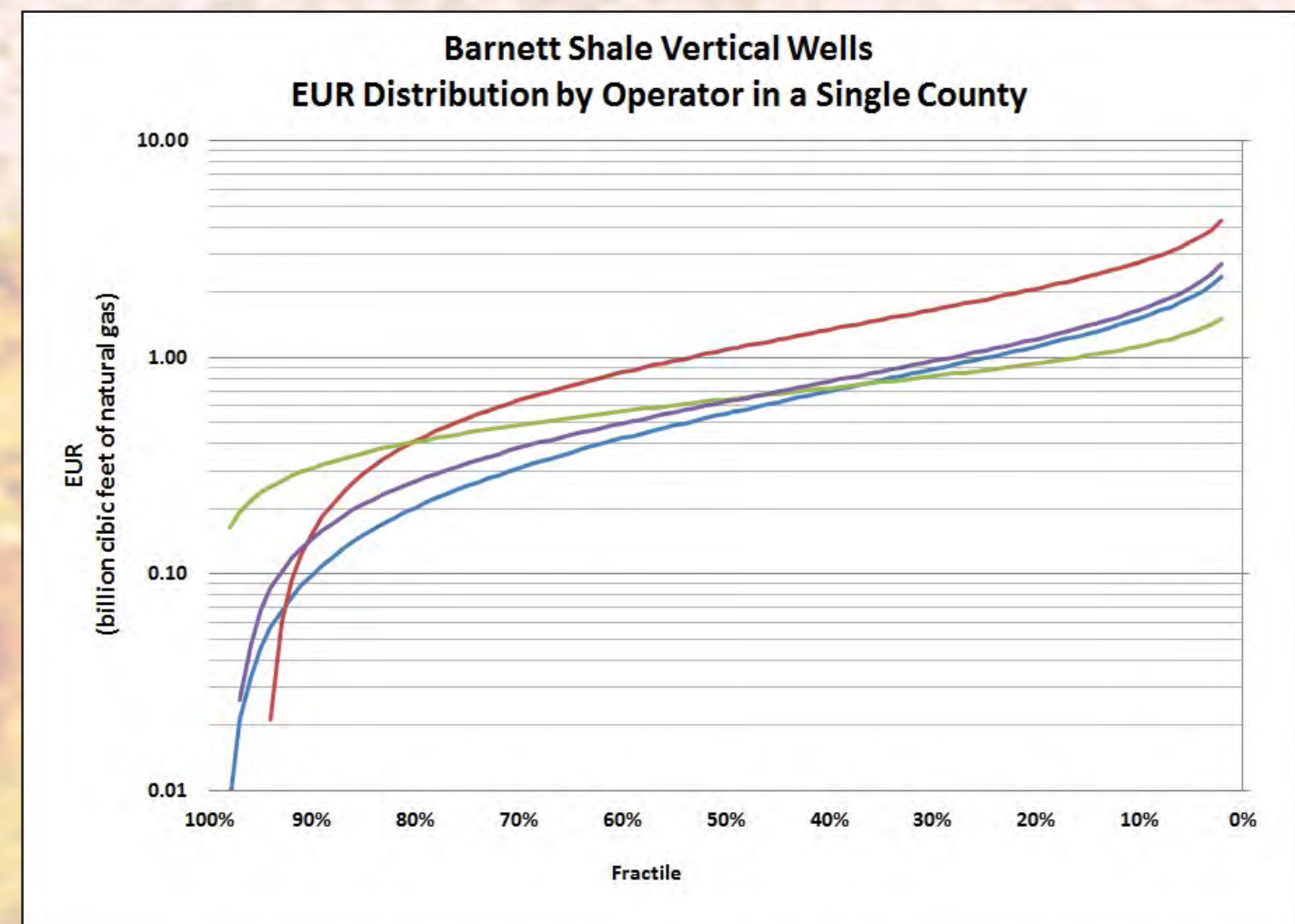


Figure 24. This plot of EUR distributions by operator for Barnett Shale vertical wells for a single county shows the variability in well productivity from operator to operator. Compare with the comparable graph for horizontal wells (figure 25).

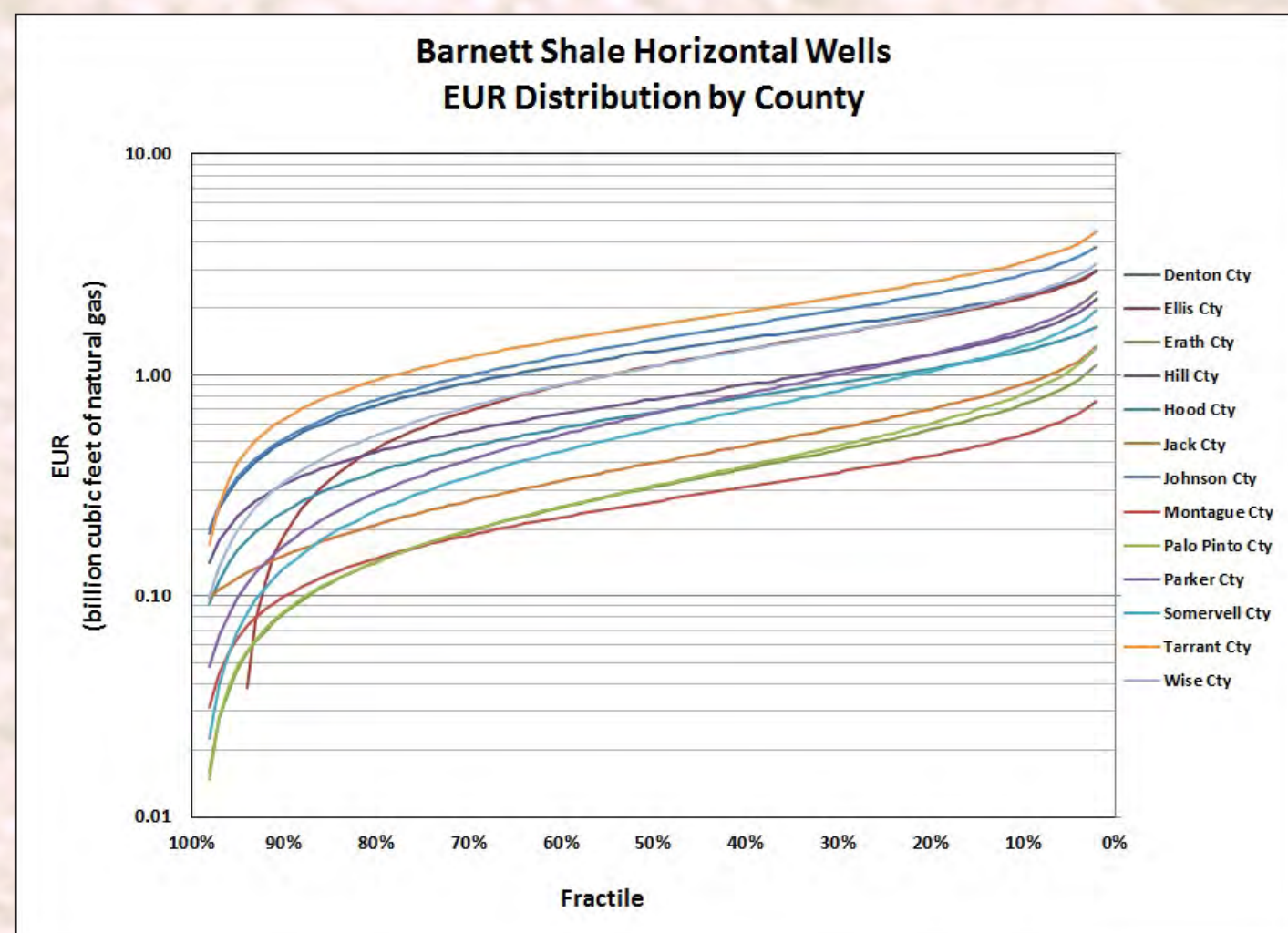


Figure 21. This plot of EUR distributions by county for Barnett Shale horizontal wells shows the variability in well productivity from county to county. Compare with the comparable graph for vertical wells (figure 20).

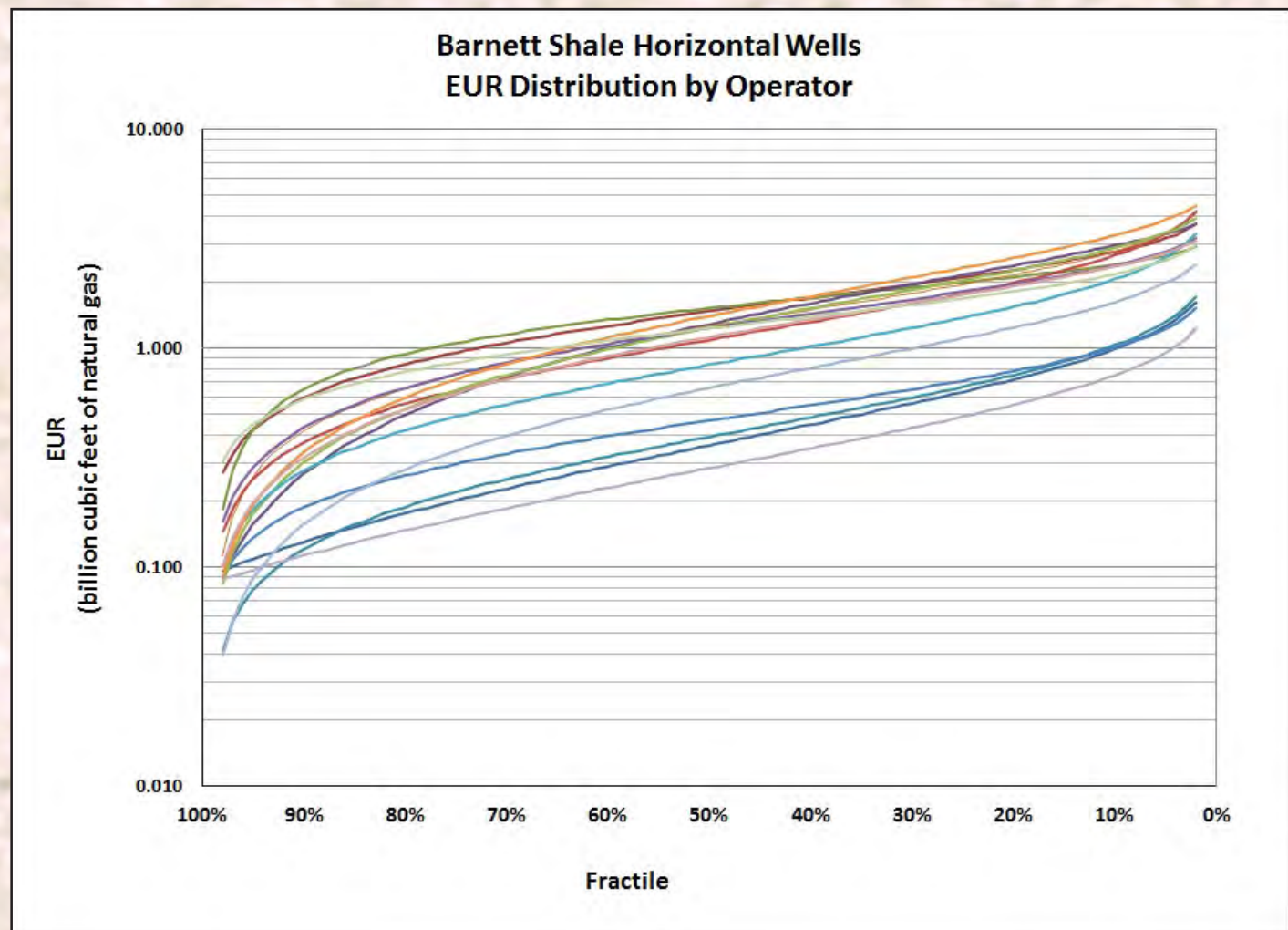


Figure 23. This plot of EUR distributions by operator for Barnett Shale horizontal wells shows the variability in well productivity from operator to operator. Compare with the comparable graph for vertical wells (figure 22).

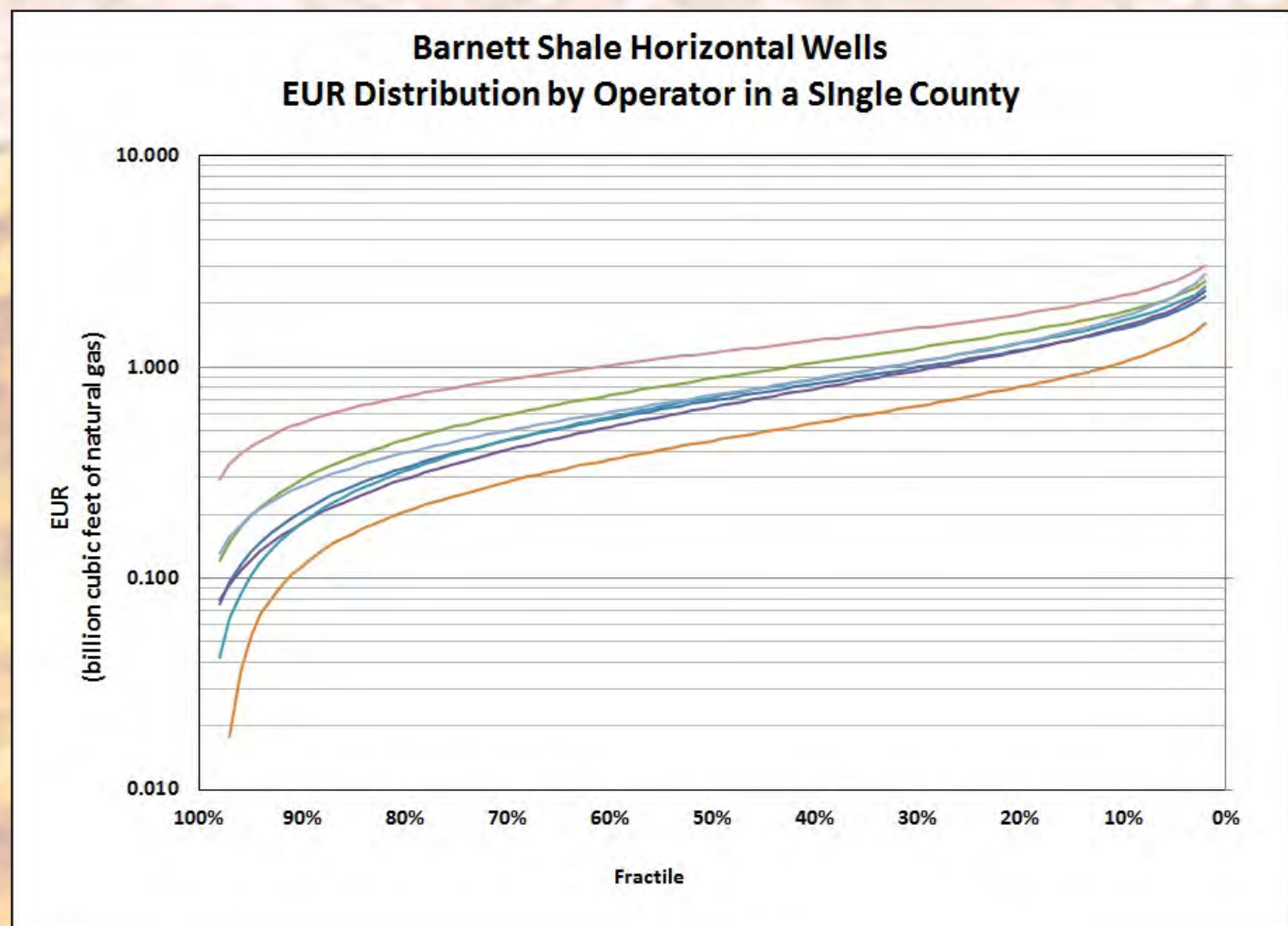


Figure 25. This plot of EUR distributions by operator for Barnett Shale horizontal wells for a single county shows the variability in well productivity from operator to operator. Compare with the comparable graph for vertical wells (figure 24).

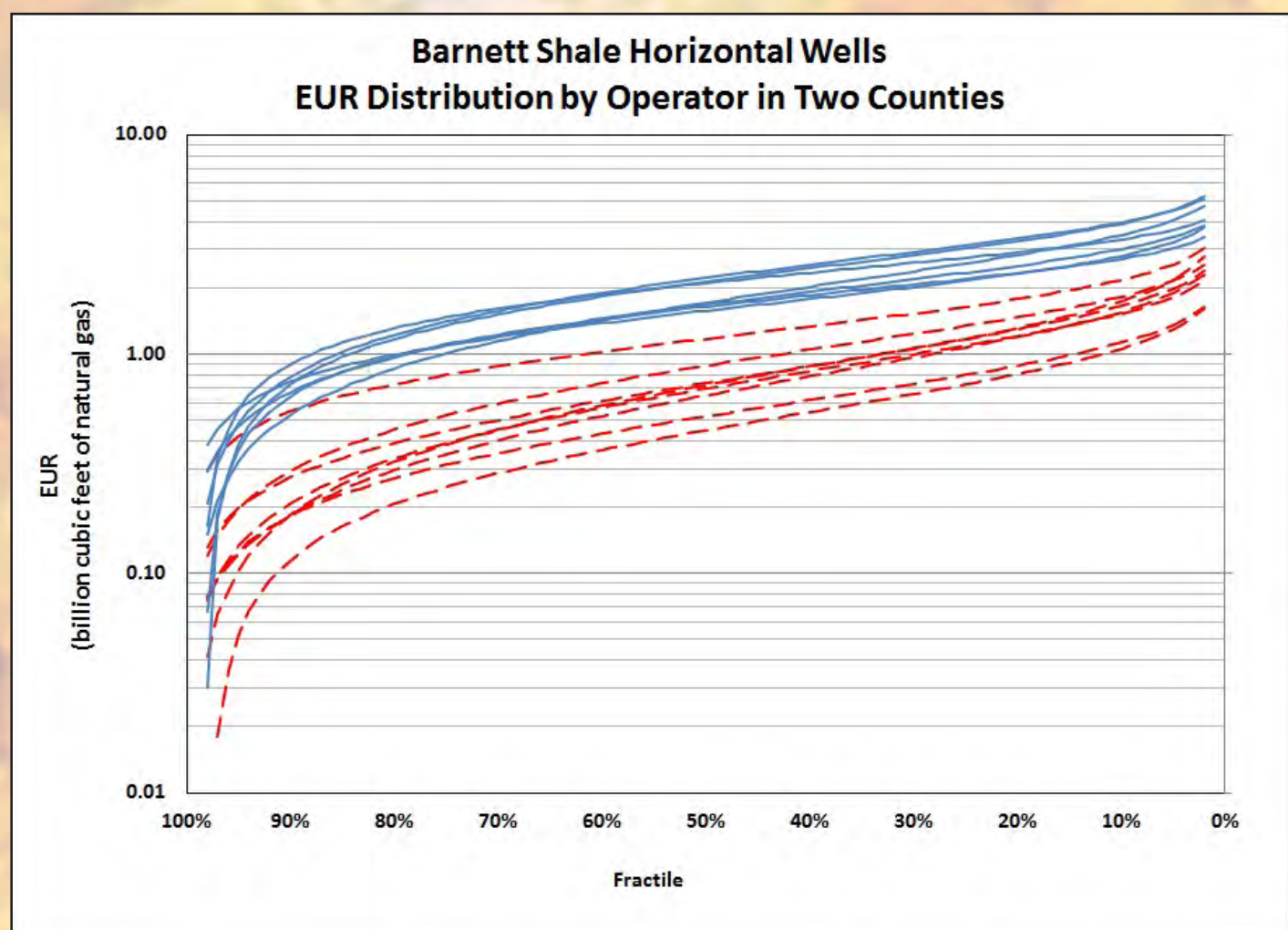


Figure 26. This plot of EUR distributions by operator for Barnett Shale horizontal wells for two counties shows that the variability in well productivity in this case is greater from county to county than from operator to operator. Operators are represented more than once in this figure if they produced wells in both counties, however a majority of the operators are the same in the two counties. Solid blue lines are EUR distributions for the first county; dashed red lines are EUR distributions for the second county.

### Changes in EUR with Time

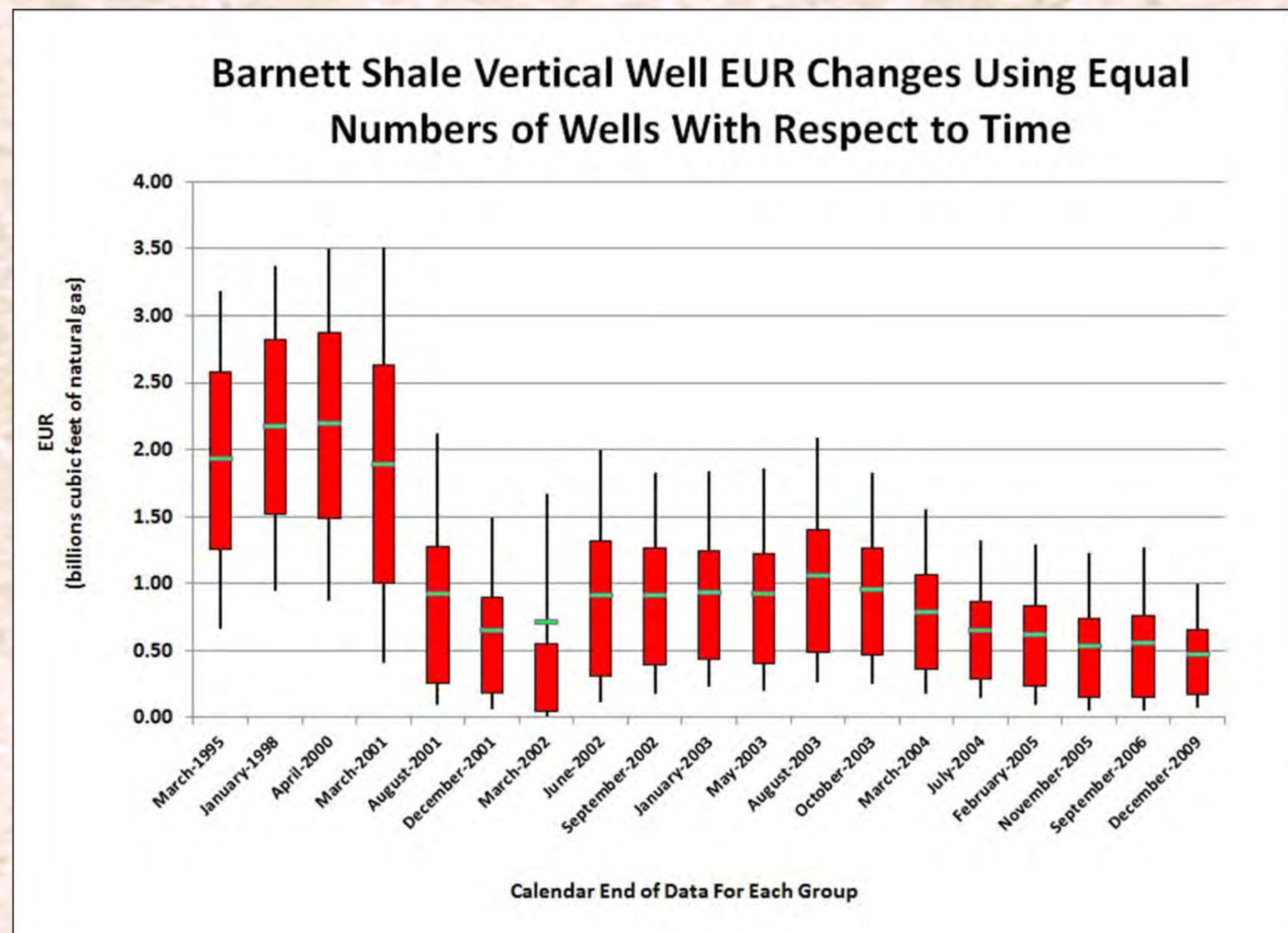


Figure 27. Changes with respect to time in EUR distributions for Barnett Shale vertical wells. Each box-whisker plot is based on a group of approximately 200 wells.

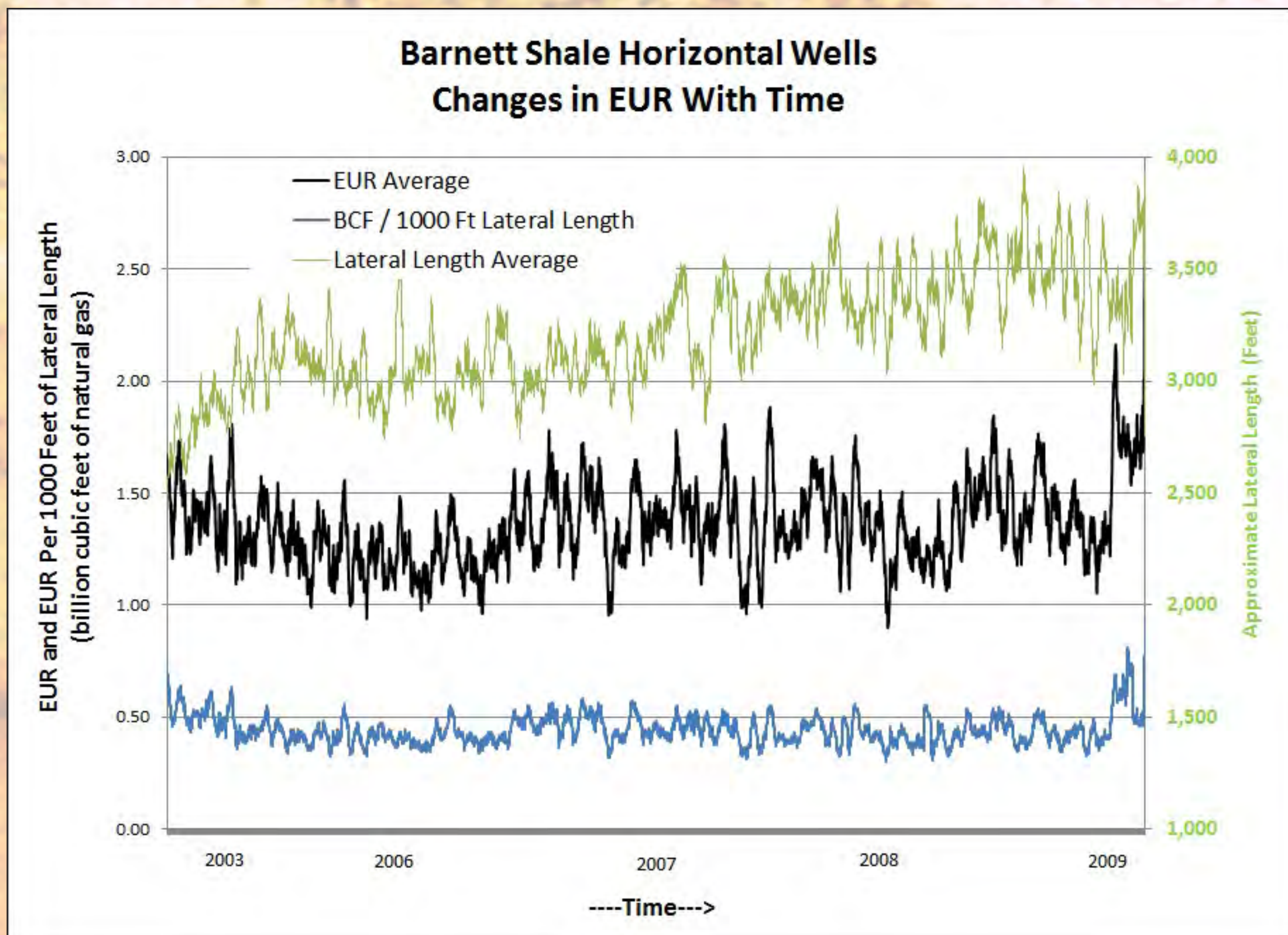


Figure 28. Changes with respect to time in average EUR for Barnett Shale horizontal wells, in average EUR per 1000 feet of lateral length, and in average lateral length. Note the trend of relatively stable productivity per 1000 feet of lateral length over more than 9000 horizontal wells in at least 13 different counties. Values for each line have been smoothed by a 50-well moving average.

### Changes in EUR with Horizontal Well Design

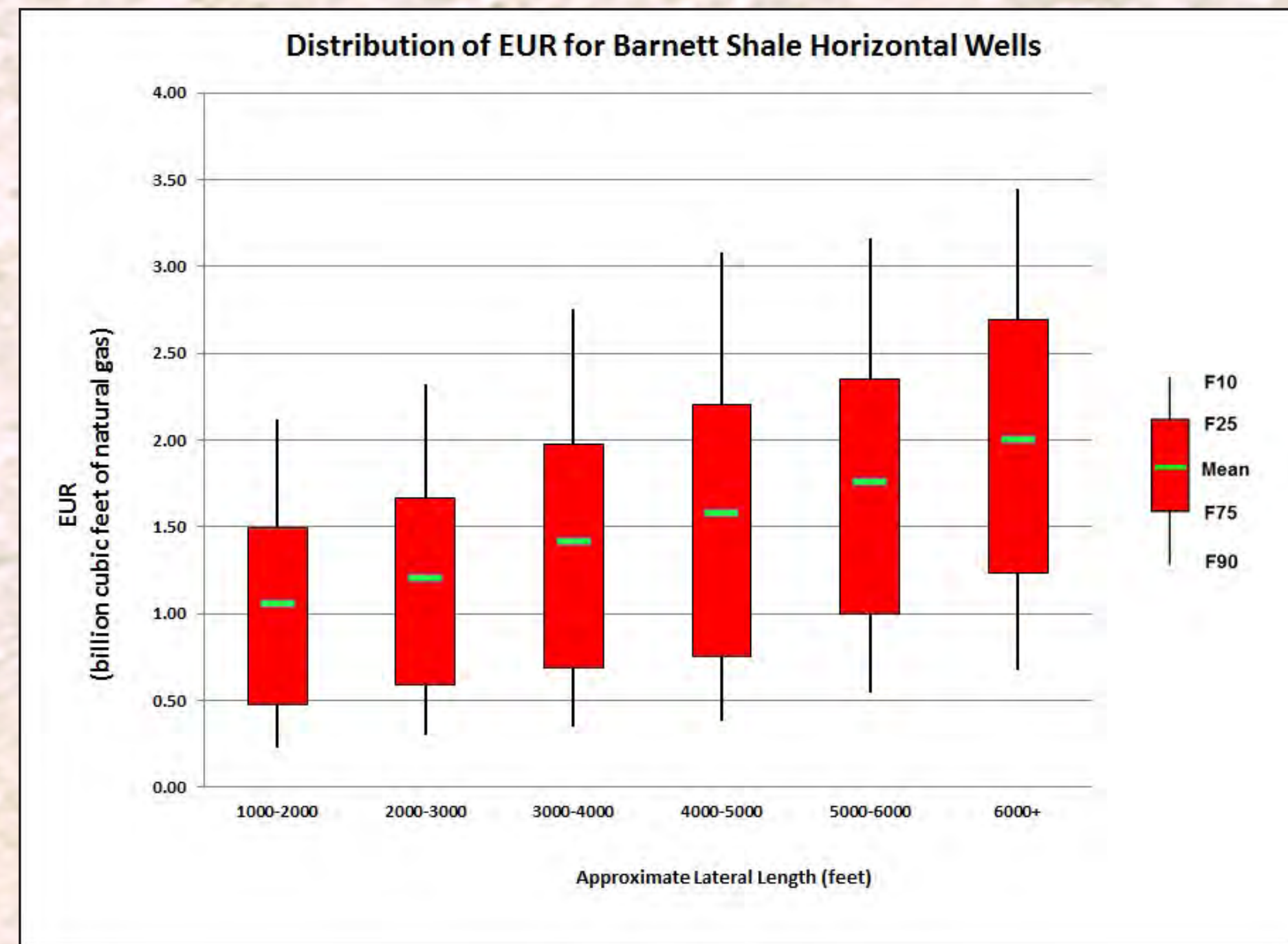


Figure 29. Plot showing increases in EURs for horizontal wells with increase in approximate lateral length. Approximate lateral length is defined as 80 percent of the horizontal difference between the surface location and the bottom-hole location.

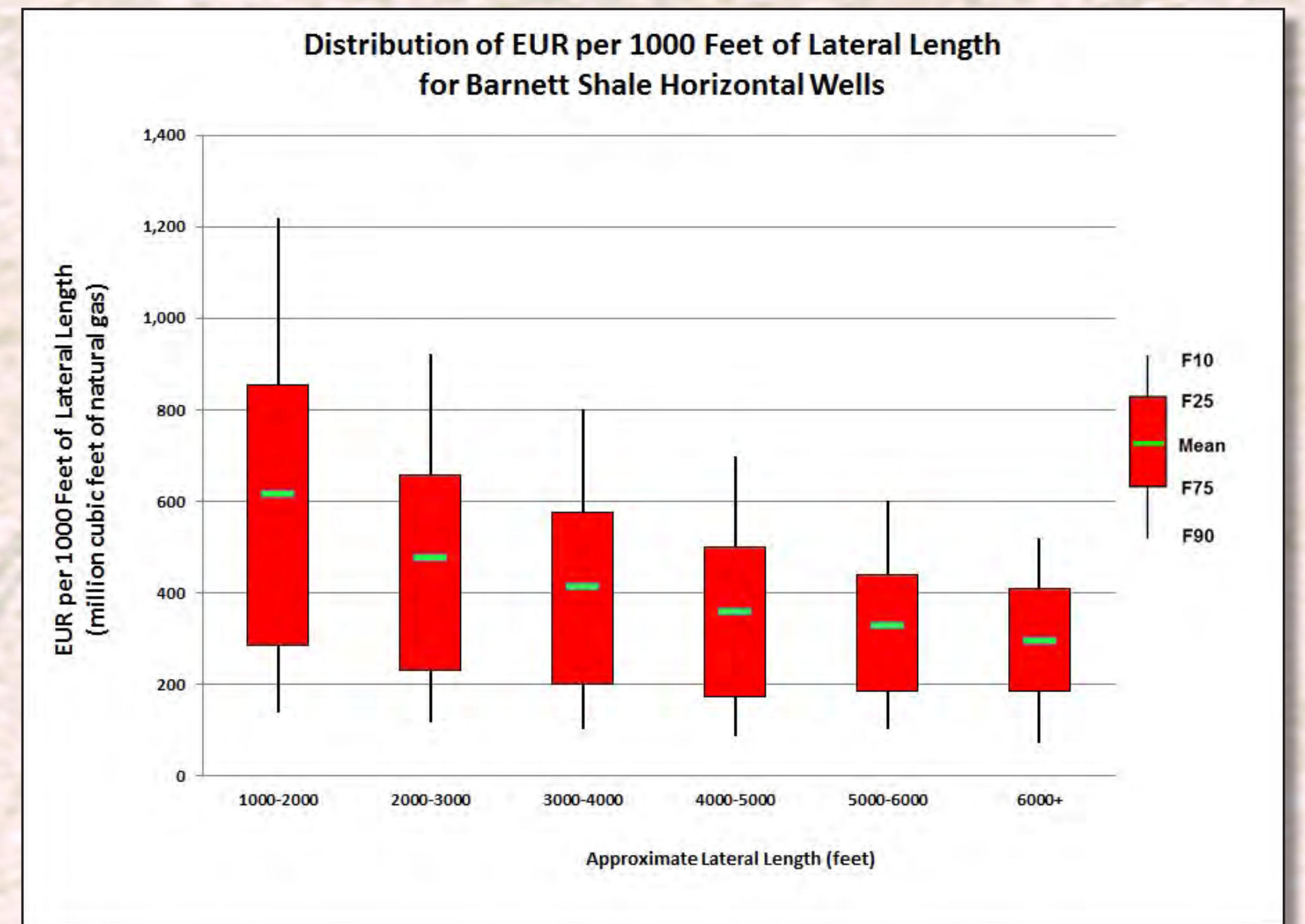


Figure 30. Plot showing decreases in EUR per 1000 feet of approximate lateral length for horizontal wells with increase in approximate lateral length. Although EUR increases with longer lateral length (figure 29), it does so with a diminishing rate of return.

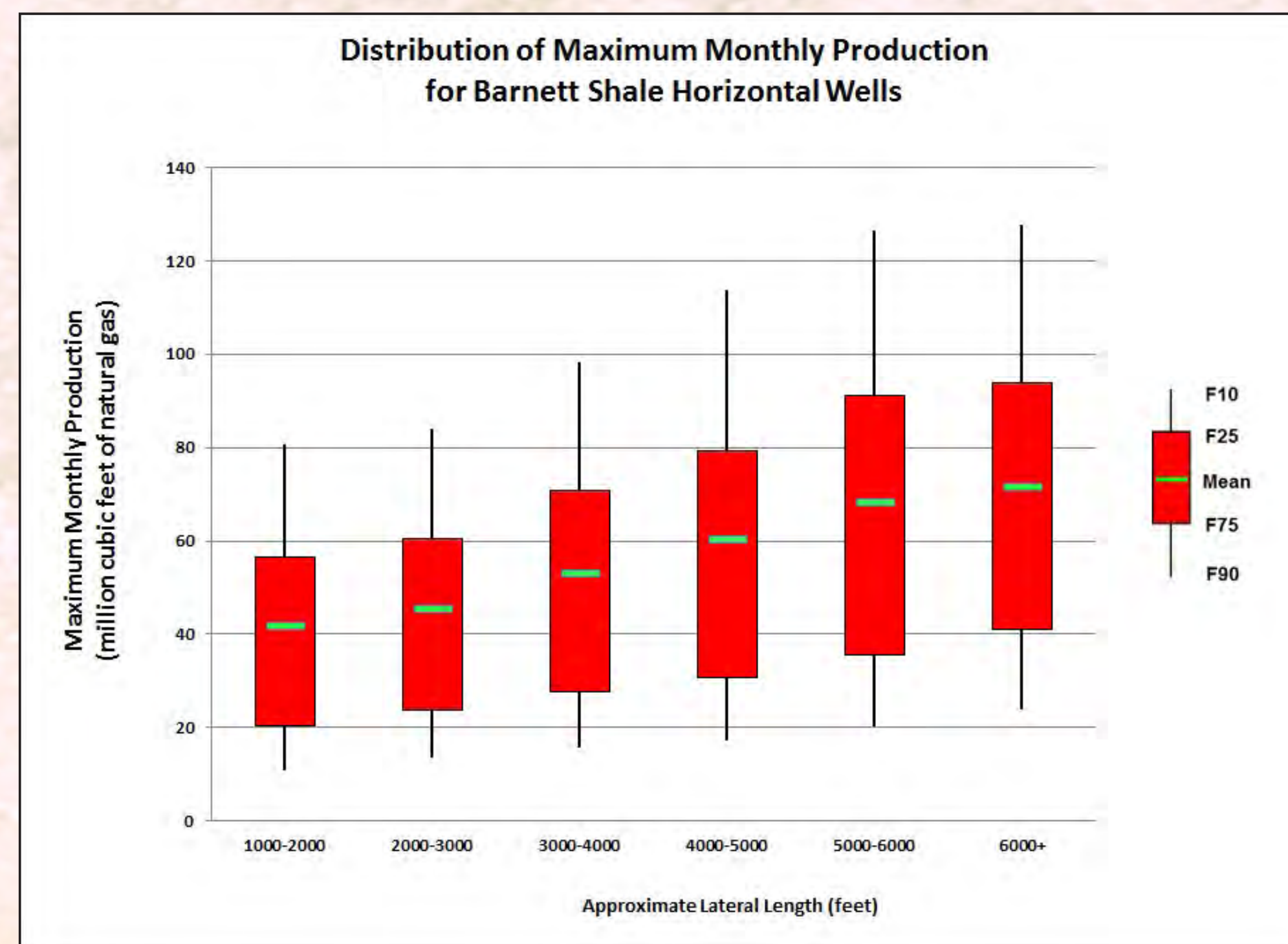


Figure 31. Plot showing increases in maximum monthly production for horizontal wells with increase in approximate lateral length. Maximum monthly production is normally the first full month of production.

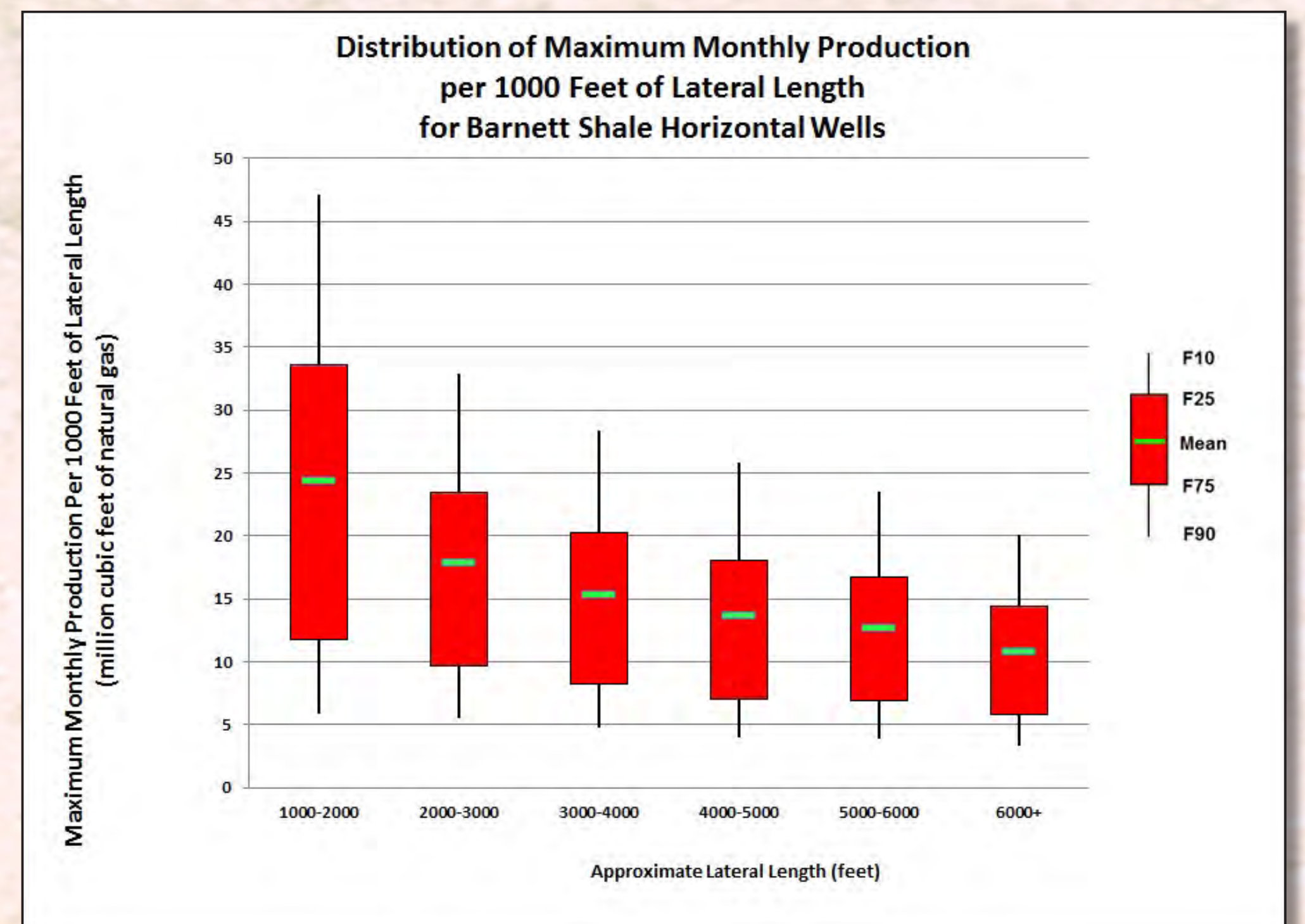


Figure 32. Plot showing decreases in maximum monthly production per 1000 feet of approximate lateral length for horizontal wells with increase in approximate lateral length. Although maximum monthly production increases with longer lateral length (figure 31), it does so with a diminishing rate of return.

### Conclusions

Examination of oil and gas well productivities in continuous AUs shows a complex interaction of factors such as geologic variability and differences in well design. Analysis of the data can lead to better estimation of productivity for undrilled sites.

### References Cited

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Publishing support provided by:  
Denver Publishing Service Center

Manuscript approved for publication Jan. 2, 2013

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Suggested citation:

Charpentier, R.R., and Cook, T.A., 2013, Variability of oil and gas well productivities for continuous (unconventional) petroleum accumulations: U.S. Geological Survey Open-File Report 2013–1001, 3 sheets